Installation & Operation Manual

MCD-104-01-x

10 Disc CD Player/Changer

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MCD-104-01-x

10 Disc CD Player/Changer

1.0 General Information

1.1 Introduction

This manual contains information for the installation of Audio International, Inc. (AI) 10 Disc CD Player/Changer, Model Number MCD-104-01-x. The "-x" suffix included in the model number designates the type of connector utilized; "1" = Positronic and "2" = D-Subminiature. Also included are mechanical and electrical characteristics of the units.

1.2 Purpose Of The Equipment

The MCD-104-01-x 10 Disc CD Player/Changer is a high quality CD player/changer specifically designed to meet the special requirements of aircraft use. This CD player/changer has the capability of storing up to ten 5" CD discs. Each CD player/changer is a complete standalone unit including all components necessary for selection and playback of CD media.

1.3 Operational Features

- DO-160C tested
- Operates directly from +28 VDC
- Compact, lightweight package
- Backlit LCD indicator (green) with front panel controls
- Optional infrared remote control capability
- AI proprietary RS-485 digital data bus compatible
- Frequency response of 20 Hz to 20 kHz (+/-1dB)
- Adjustable audio output level of 1 to 5 VRMS
- Standard plating options for front bezel
- No cooling requirements
- Specially designed to meet aircraft standards

1.4 Optional Equipment

Audio International, Inc. offers a comprehensive family of Cabin Control Modules for PC interface. These modules provide convenient solutions for a variety of frequently encountered interfacing needs or special requirements and are an important part of AI's "building block" system for configuring total cabin management.

Contact your AI representative for details.

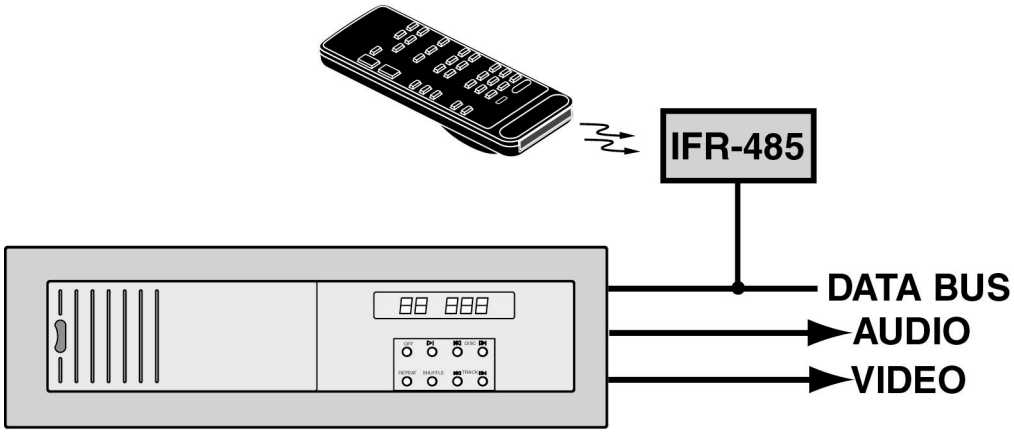
2.0 Application

2.1 Introduction

Audio International's MCD-104-01-x provides a high-quality system that has the capacity of storing and playing up to ten 5-inch CD audio discs all in one (1) convenient unit.

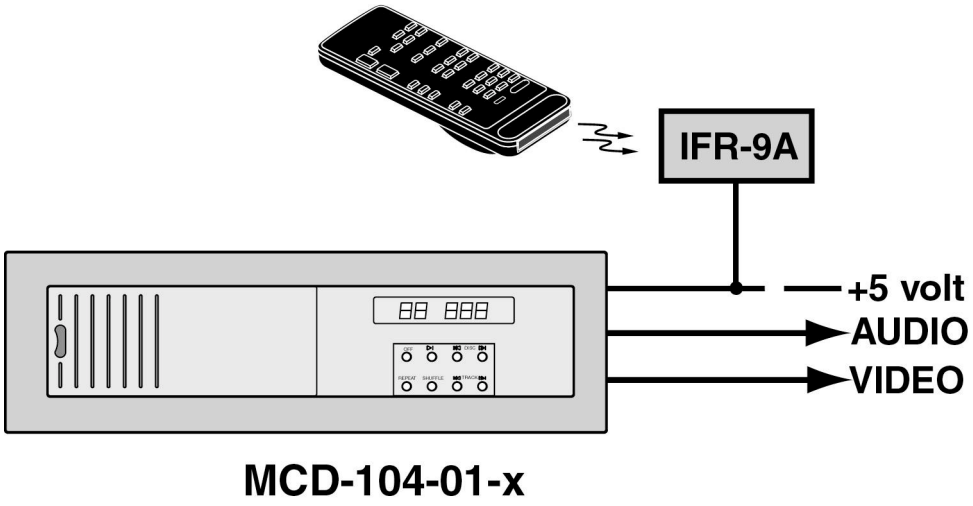
2.2 Block Diagram -Typical Application

This system is fully compatible with Audio International's proprietary RS-485 digital data bus system. It can be configured for IR remote control utilizing AI's remote control unit AI-RCx-17xxxx and IFR-485.

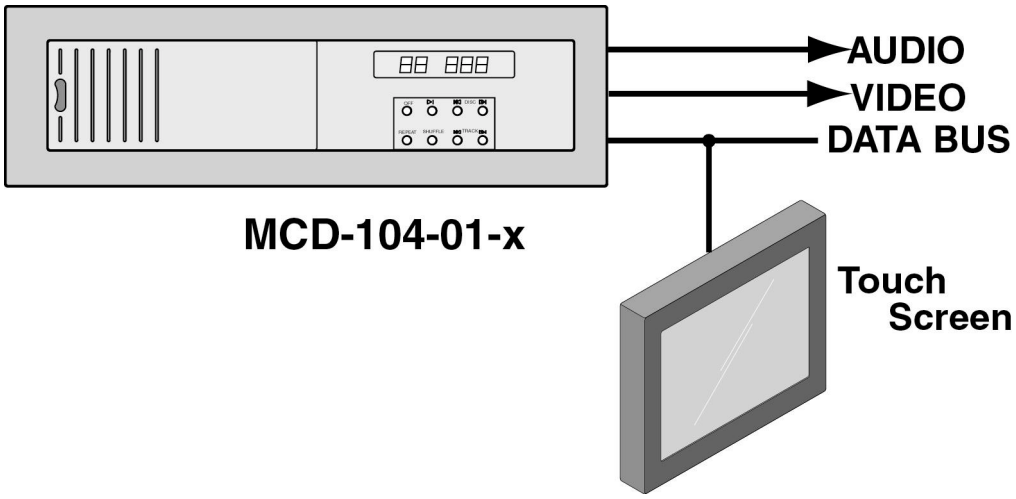


MCD-104-01-x

The unit can also be configured for IR remote control utilizing AI's remote control unit AI-RCx-17xxxx and IFR-9A. This following configuration utilizes a +5 VDC digital logic level for activation of infrared commands. Connection to multiple IFR-9A units utilizing the +5 VDC digital logic level connection requires an external Schottkey diode at each IFR-9A unit. This will prevent signal loading. Contact AI for details.



The unit can also be configured for Touch Screen or remote panel control (i.e. entertainment control panels). The panels are on AI's proprietary RS-485 digital data bus system and configured to control the operational features of the MCD unit.



2.3 Data Bus Control

The MCD-104-01-x is designed to interface with other Audio International equipment via AI's proprietary RS-485 serial data bus.

2.4 Potentiometer Settings

Right and left output level adjustments are located on the side of the unit. The adjustment potentiometers allow the user to change the output level between 1 and 5 VRMS. To increase the level, turn the potentiometer screw clockwise; to decrease, turn the screw counterclockwise.

3.0 Installation

3.1 Prior to Installation

3.1.1 During the design and layout of the aircraft cabin, careful consideration of the location of this and all other audio/video modules is necessary. Some of the items to consider include:

- Space
- Proximity to other devices (i.e. source equipment)
- Available power supply
- Length of cable runs
- Environmental conditions (temperature, humidity, etc.)
- Location of other aircraft systems (i.e. oxygen delivery)
- Access for service repair (if applicable)
- Convenience for user interface (if applicable)

3.1.2 The MCD-104-01-x shall be installed to conform to the standards designated by the customer, installing agency, and existing conditions as to the unit location and type of installation.

3.1.3 Temperature consideration of the installation area is important. Operating temperature range for the unit is between -15° and +55° Celsius.

3.2 Unpacking and Inspection

3.2.1 Carefully open the packaging and remove the MCD-104-01-x. Verify that all components have been included in the package per the packing list. Inspect the unit for shipping damage.

3.2.2 If damage has occurred during shipping, a claim should be filed with Audio International WITHIN 24 hours and a **Return Request Authorization Number** shall be obtained from AI. Refer to the front cover of this manual for address and telephone number of Audio International, Inc. Repackage the unit in its original packaging materials and return it to AI following instructions given by the AI representative. If no return is necessary, retain the packing list and the packing materials for storage.

3.3 *Cautions and Warnings*

3.3.1 It is important to do a pin-to-pin power and ground check on all connectors. Ensure that power and ground are applied only where specified. Damage to the unit may result if power or ground is applied to the wrong points.

3.3.2 **DO NOT** remove any factory-installed screws. Damage to the unit may result and void any warranties.

3.3.3 **DO NOT** install near heat sources such as direct sunlight, warm air exhausts, or heaters.

3.3.4 **No** scheduled maintenance is required to ensure continued airworthiness.

3.3.5 **DO NOT** touch the liquid crystal fluid if the LCD case is damaged or broken. It may be dangerous and cause serious harm. If your body or clothing is exposed to the fluid, wash immediately with soap and water.

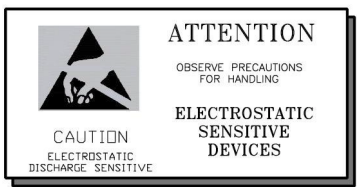
3.3.6 Headphone amplifiers and line level amplifiers should be located no more than three (3) feet away from source equipment.

3.3.7 **DO NOT** mount the MCD-104-01-x on its side, at an angle, or in an inclined position.

3.3.8 **DO NOT** load media into player when humidity is high and media and/or player have not warmed above the dew point; these conditions are conducive to condensation forming in the player and may eventually damage the equipment. Allow a warm-up internal of 30 to 40 minutes before inserting media into the MCD if condensation might be a problem.

3.3.9 The MCD unit should be cleaned after every 200 hours of service or when normal operations indicate difficulty in loading or playing media that has no apparent dirt or scratches. Cleaning should be done using a CD, DVD, and CDROM laser lens cleaning CD like Maxwell CD-340 or equivalent. Follow the manufacturer's instructions included with the cleaning CD.

3.3.10 **ESD** (Electro Static Discharge) guidelines shall be followed.



3.4 Compact Disc Care

3.4.1 **When** playing a disc for the first time, check that there are no burrs stuck in the center hole of the disc.

3.4.2 **Do not** touch the playback side of the disc; do not apply tape to either side of the disc.

3.4.3 **Do not** store discs in hot locations or in areas exposed to direct sunlight. Do not store in damp, moist areas.

3.4.4 **Do not** stack loose discs or prop them against anything. Remove discs from the player and return them to their cases immediately after each use.

3.4.5 **Do not** clean with solvents or other chemicals. To clean discs, wipe gently with a soft, lint-free cloth. Start from the center of the disc and wipe outward in a circular motion. Dust or fingerprints on the disc may cause sound or picture difficulties.

3.4.6 **Do not** use liquid or aerosol cleaners on the DVD unit. When cleaning heavy dirt from the unit, soak a soft cloth in a weak detergent solution. Wring out excess liquid and gently wipe the unit. Dry the unit thoroughly with a soft cloth.

3.5 Wiring Requirements

The installing agency shall supply and fabricate all external cables and connectors. The length and routing of external cables should be carefully studied and planned before attempting installation of the equipment. Allow adequate space for installation of cable and connectors.

3.5.1 Power and Ground Wiring

All power and ground wires shall be 22 AWG, MINIMUM, shielded twisted pair with the shield properly bonded at one end only. Power ground wires shall be bonded to electrically conductive chassis mounting point with <1 Ω resistance or <50 Ω impedance. Twisted shielded pair cable shall be in accordance with the standard military specification of **MIL-DTL-27500** or equivalent.

3.5.2 AI's Proprietary RS-485 Data Bus

The MCD-104-01-x is designed to interface with other Audio International equipment via AI's proprietary RS-485 serial data bus. The data bus shall be implemented using a twisted shielded pair cable in accordance with the standard military specification of **MIL-DTL-27500** or equivalent. The wire size for the conductors in this cable shall be 22 AWG, MINIMUM. Shield pins are available for connecting data bus shields when required. Shield terminations shall be made as close to the connector pin as possible.

All modules on AI's proprietary RS-485 data bus shall be connected in a 'daisy-chain' configuration. AI's proprietary RS-485 data bus specification is available upon request.

3.5.3 Audio Lines

All analog audio wiring shall be 24 AWG (MINIMUM) twisted, shielded cable in accordance with the standard military specification of **MIL-DTL-27500** or equivalent unless otherwise specified.

3.6 Physical Characteristics

3.6.1 The MCD-104-01-x shall be located away from heat sources, magnetic fields, direct sunlight, and areas with excessive dust. The unit shall NOT be mounted to the skin of the aircraft.

3.6.2 Refer to Section 6.0 for unit dimensions and mounting hole sizes.

3.6.3 The unit shall be rigidly mounted to its location using the appropriate fastening hardware supplied by the installing agency.

3.6.4 When mounting the unit to the aircraft's frame, allow sufficient space for mating connectors.

3.7 Electrical Characteristics

3.7.1 Electrical Specifications:

Electrical	Power	1A Maximum @ +28 VDC
	Operating Voltage Range	+18 to +30 VDC
	Data Bus Type	AI Proprietary RS-485
	Audio Frequency Response	20 Hz to 20 kHz
	Audio Output	1 to 5 VRMS (2 kΩ minimum load) Factory preset at 2 VRMS
	Audio S/N	93 dB (nominal)
	Dynamic Range	93 dB
	Channel Separation	85 dB
	Infrared Input	+5 VDC Digital Logic Level

3.7.2 Standard configuration requires no infrared strap pins to be connected. Each different type of AI source equipment can be configured to accept one (1) of four (4) different sets of infrared codes. To change the code settings, connect one (1) of the strap pins to the strap common (never connect more than one (1) strap pin to the strap common). Three (3) strap pins are available to allow the infrared codes to be configured.

3.7.3 The MCD-104-01-x has been designed to combine the control head and remote unit into one (1) enclosure. The unit utilizes one (1) 15-pin connector for electrical connections. P1 provides +28 VDC power, ground, left/right audio output, data bus control, infrared input, and four (4) strapping pins for alternate configuration of the infrared digital command codes.

3.8 Mating Connector Information

Model #	Pin #	Mating Connector
MCD-104-01-1	P1	RD15F10JVL0
MCD-104-01-2	P1	DAMA-15S

3.9 Pinout Assignment and Descriptions

Pin #	Description
1	+28 VDC Power In
2	Ground
3	R+ Audio Output
4	R- Audio Output
5	L+ Audio Output
6	L- Audio Output
7	Data Bus (A)
8	Data Bus (B)
9	Infrared Input +
10	Infrared Input -
11	IR Strap 2
12	IR Strap 3
13	IR Strap 4
14	IR Strap Common
15	Reserved

3.10 Post-Installation Test

3.10.1 With the aircraft power ON, apply power to the MCD-104-01-x. Load the CD remote unit with from one (1) to ten 5" CDs. Press the PL/ST (play/stop) button on the control head to start playback.

3.10.2 Select a CD with the DISC ADV (disc advance) or DISC REV (disc reverse) buttons. Select a specific track of the CD and press the TRACK ADV (track advance) or TRACK REV (track reverse) buttons. The LCD display will indicate the CD number and track that has been selected for playback as well as the elapsed time.

3.10.3 Press the PL/ST button on the control head. Press EJECT on the remote unit. Remove the CDs from the CD magazine. If there is a diagnostic error in the CD changer system, the LCD indicator will display several different error codes. Refer to Section 5.3, Troubleshooting Chart, for a definition of these error codes.

4.0 Operation

4.1 Introduction

4.1.1 The MCD-104-01-x can be operated via front panel buttons or optionally controlled by infrared remote or AI's touch screen panel. Digital codes allow the unit to interface with an infrared handheld remote via an infrared receiver, IFR-9A or IFR-485. Multiple units can be controlled independently using available programming pins.

4.1.2 Although control options vary among units, standard commands are with front button control, remote or touch screen include play/pause, forward and reverse track search, forward and reverse disc search, and shuffle.

4.1.3 Before setup or playing a CD, ensure that aircraft power is applied to the player.

4.1.4 Load up to 10 CDs into the magazine with the label side up. Open the door on the remote changer and carefully insert the magazine. Observe the arrow on the magazine for proper orientation.

4.1.5 Push the magazine into the unit until it clicks. If the magazine does not slide into the unit easily, check the orientation and retry. Do not excessive force. If the magazine does not lock properly, take the magazine out, press the EJECT button inside the doorframe and reinsert in accordance with the instructions above. Close the door on the CD magazine compartment.

4.2 Unit Operation

OFF Press the OFF button to remove power to the MCD unit.

With a magazine loaded in the changer, press the PLAY/PAUSE button on the unit or hand-held IR remote transmitter. The first CD will begin to play. The display on the unit will indicate the number of the CD and the track currently playing. Press the button a second time to pause the CD. Press the same button to resume play from the position the CD was paused.

Press the REVERSE DISC SEARCH button once and release. The unit will return to the beginning of the previous CD and begin play at the first track. Press the button repeatedly to reverse search through multiple CDs. Stop pressing when the desired CD is reached and playback will begin.

Press the FORWARD DISC SEARCH button once and release. The unit will advance to the next CD and resume play at the first track. Press the button repeatedly to advance through multiple CDs. Stop pressing when the desired CD is reached and playback will begin.

REPEAT

Pressing the REPEAT button toggles between Repeat Track 1 (REP 1), Repeat CD (REP2), or Cancel. Press the REPEAT button until the desired setting appears (REP 1 or REP 2). After five (5) seconds, the repeat play starts. REP 1 can be selected to repeat the current track; REP 2 can be selected to repeat the current disc. To go back to the normal playback mode, press the REPEAT button until the "REP" disappears from the digital display.

Press REVERSE TRACK SEARCH once and release and the unit will return to the beginning of the current track on the CD and resume play. To locate a previous track, press the button repeatedly to reverse through multiple tracks. Stop pressing when the desired track is reached and playback will begin.

Press FORWARD TRACK SEARCH once and release and the unit will advance to the next track on the CD and resume play. Press the button repeatedly to advance through multiple tracks. Stop pressing when the desired track is reached and playback will begin.

SHUFFLE

While a CD is playing, press and **HOLD** the SHUFFLE button. The CD player will scan through the current track and subsequent tracks until released. The display will indicate elapsed time. Release the button to resume play at the new position. Each time the SHUFFLE button is pressed, the display toggles between SHUFFLE modes. SHUF 1 can be selected to play the tracks on the current disc in a random order; SHUF 2 can be selected to play all the discs in a random order. After five (5) seconds, the shuffle play starts. To go back to the normal playback mode, press SHUFFLE until "SHUF" disappears from the digital display.

4.3 Optional Remote Operation

The following functions can be controlled using Audio International's optional remote control unit customized for your system configuration.

4.3.1 To Play a CD:

With a magazine loaded in the changer, press the play/pause button on the remote. The first CD will begin to play. The display on the control head will indicate the numbers of the CD and track that is playing. Press the play/pause button to pause the CD. Press the same button to resume play from the position at which the CD was paused.

4.3.2 To Advance or Repeat Tracks:

Press the track advance button on the remote once and release. The unit will advance to the next track on the CD and resume play. Press the track advance button repeatedly to advance through multiple tracks. The unit will resume playback when the requested track is reached. Press the track reverse button on the remote once to start at the beginning of the current track. Press the track reverse button repeatedly to reverse through multiple tracks.

4.3.3 To Scan Tracks:

While a CD is playing, press and **HOLD** the track advance button on the remote. The CD player will scan through the current track and subsequent tracks until released. Release the button to resume play at the new position. Press and **HOLD** the track reverse button to scan backward through the tracks. Release the button to resume play at the new position.

4.3.4 To Advance or Repeat Disc:

Press the disc advance button on the remote once and release. The unit will advance to the next CD and resume play at the first track. Press the disc advance button repeatedly to advance through multiple CDs. The unit will resume playback when the requested CD is reached. Press the disc reverse button on the remote once and release. The unit will return to the beginning of the current CD and resume play at the first track. Press the disc reverse button repeatedly to reverse through multiple tracks. The unit will resume playback when the requested CD is reached.

4.3.5 To Use Shuffle Mode:

Press the shuffle button on the remote. The display on the control head will indicate SHUF1. The unit will play all tracks on a CD in random order and advance to the next CD in sequential order. Press the shuffle button a second time. The display on the control head will indicate SHUF2. The unit will play all tracks on all CDs in random order. Press the shuffle button a third time to clear the display and return the unit to standard play.

4.3.6 To Use Repeat Mode:

Press the repeat play button on the remote. The display will indicate REP1. The unit will repeat the current track indefinitely. Press the repeat play button a second time. The display will indicate REP2. The unit will repeat the current CD indefinitely. Press the repeat play button a third time. The display will clear and the unit will return to standard play.

5.0 Troubleshooting

5.1 Introduction

Most functional problems are detected during the post installation test; refer to 3.10, Post-Installation Test. Once the unit has passed these tests, it can be functional for many years of service.

5.2 General Troubleshooting Procedures

- To verify power to the unit, recheck +28 VDC power is applied to the proper pins on the unit. Use a voltmeter to verify correct level.
- Reset by removing power from the unit for at least one minute.
- Recheck all connections to the unit for security. Check all harness runs for possible pinching and all pinouts for application accuracy.

- To check data bus integrity, utilizing a voltmeter, oscilloscope, or other voltage instrument, verify proper input voltage on the data bus pins. Typical measurements with no device(s) on bus transmitting are as follows:

  A-to-Ground : 4.0 to 4.5 VDC
  B-to-Ground : 0.1 to 1.0 VDC

  If any device is transmitting (i.e., holding bus active), then these typical measurements would be reversed for the A-to-Ground and B-to-Ground measurements. This troubleshooting tool can help indicate a data bus lockup. If this occurs, remove the data bus from all other equipment one piece at a time. As each is removed, check the bus status to see if it is now functioning properly. Once you have removed the piece or pieces of offending equipment, disconnect power and then reconnect everything but the suspect component, reapply power and test the functionality of the unit.
- The RS-485 data bus is a bi-directional bus without a 'bus controller'; it uses a differential digital signal that will transmit only when commands are entered via switch selection or other system synchronizing commands. The "A" leg of the bus is HI and the "B" leg LOW.

5.3 Troubleshooting Chart

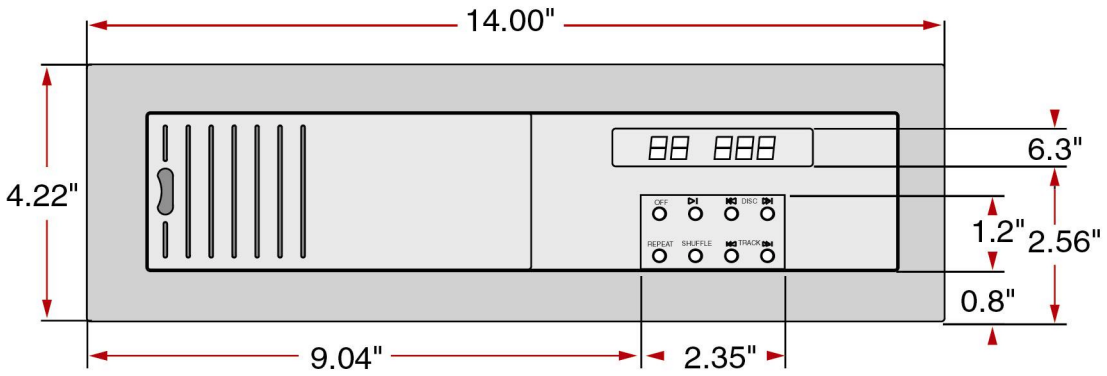
Problem	Possible Cause	Solution
Sound skips	➢ CD is dirty or defective	• Clean CD or replace it.
DC magazine will not lock in the changer	➢ Magazine installed incorrectly	• Remove the CD magazine, press EJECT, reinsert the magazine until it is locked securely.
Error Message – E-01	➢ CD magazine not inserted into changer	• Insert the magazine.
Error Message – E-02	➢ CD not inserted in the magazine	• Remove magazine and insert CDs.
Error Message – E-04	➢ CD is dirty or inserted upside down	• Clean CD, reinsert correctly.
Error Message – E-99	➢ Unit malfunctioning	• Contact AI Customer Support.

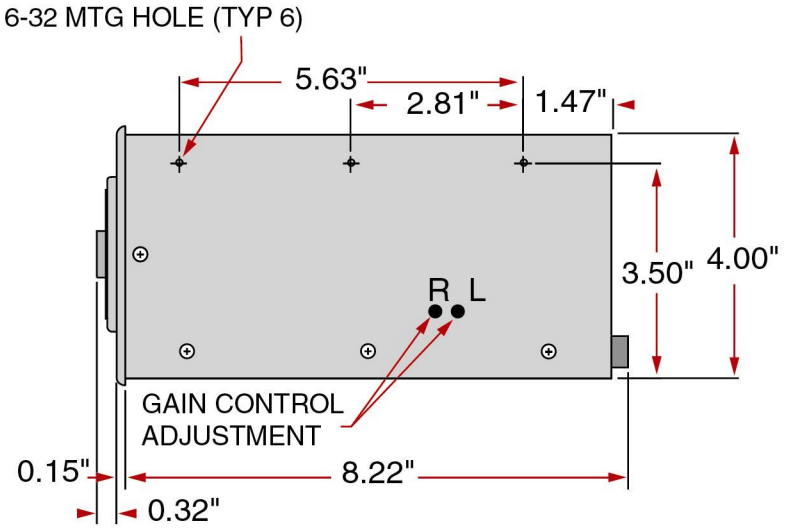
6.0 Specifications

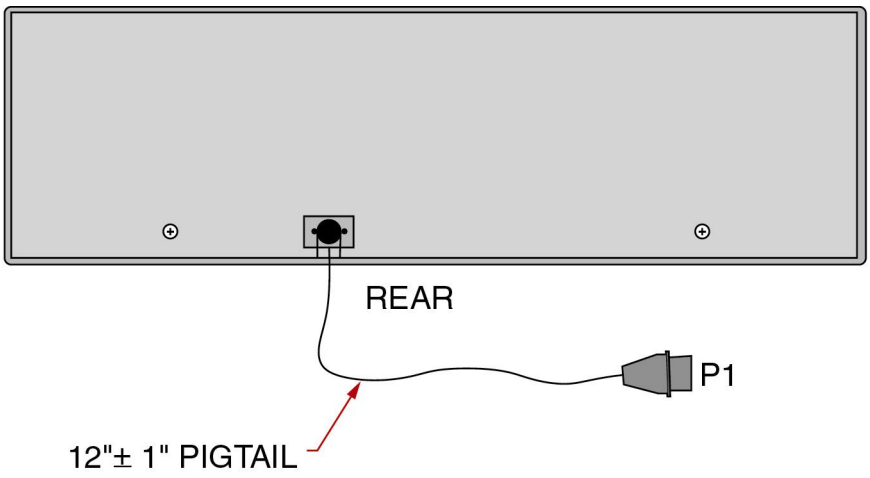
Physical Specifications	
Housing	Aluminum
Weight	9.25 lb / 4.20 kg
Dimensions (l x w x h)	8.22" x 13.8" x 4.0" 20.88 cm x 35.1 cm x 10 cm

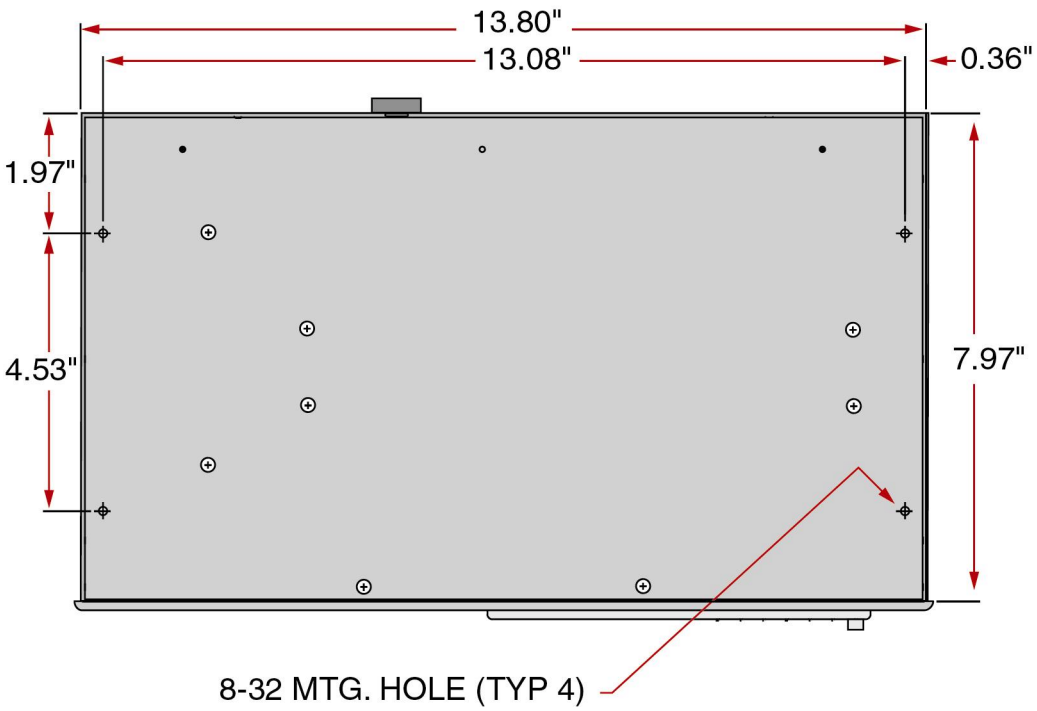
7.0 Reference Drawings

The following diagrams show the unit dimensions, mounting locations, and connector locations for the MCD-104-01-x.






REAR
P1
12"± 1" PIGTAIL


13.80"
13.08"
0.36"
1.97"
4.53"
7.97"
8-32 MTG. HOLE (TYP 4)